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Evolving the NASA Earth Sciences Enterprise (ESE) Data Center

(and introducing our new name)

by Steve Kempler

In the latter part of the last decade NASA, and ESE in particular, made strategic decisions regarding the management of Earth science data. Specifically, cross enterprise data management is moving toward a more distributed, layered approach that includes additional private and public entities, and remote sensing data processing is being taken on by science teams to implement and execute at an increasing rate. Advanced technologies support these data management strategies. In response to these changes in direction, the ESE Data Centers (a.k.a., DAACs) need to adjust their strategies to best accommodate the new Earth science data management environment. Successful adjustments will

- be responsive to the needs of science research and applications data managers by providing data management and value added data services for their use
- provide a means to develop and deploy efficient, cost effective, and modern services that can be applied to Earth science data and information products based on the needs and requirements of the Earth Sciences community
- provide products and services in response to and in cooperation with DAACs, ESIPs, RESACs, etc., to facilitate the accomplishment of their data management goals
- provide an organization for developing, controlling, and distributing internally and externally developed services that can be applied to Earth science data management and research
- share data management expertise and experience with organizations new to data management.

The GSFC Earth Science Data Center Response

The Goddard Earth Sciences (GES) DAAC is housed by the Global Change Data Center (GCDC), GSFC Code 902. Its response to ESE's data management strategic changes focused on separating the development and deployment of value added products and services from its core data management work. The new organization, still within GCDC, is called the Goddard Earth Sciences Data and Information Services Center (GES DISC), and it encompasses the GES DAAC and the Products and Services Cooperative (PSC or "the Co-Op").

1. ***The Distributed Active Archive Center (DAAC)*** -- Responsible for the execution of heritage DAAC data management functions including system execution of V0, V1, and V2 (data ingest, archive, production, distribution, management, and user services); system engineering that supports V0, V1, and V2; data support for V0, V1, and V2; science software integration for V2; and development of DAAC Unique Extensions. For more details see "The GES DAAC: How It Works" in *The Global Scanner, 1:1,* summer 1999. The GES DAAC's goal is to efficiently and cost effectively ingest, produce, archive, and distribute Earth science data and information related to hydrology, ocean biology, atmospheric dynamics and chemistry, and land biosphere, and perform the data management functions and services that maximize the use and usefulness of these data and information.
2. ***The Products and Services Cooperative (PSC or Co-Op)*** -- Responsible for new products and services in cooperation with and support of the

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New NOAA-NASA 8-km Pathfinder AVHRR Land Products

by James McManus

— with Peter Smith and Lee Kyle —

The Global Land Biosphere (GLB) group at the GES DAAC have produced two new products using the NOAA-NASA 8-km Pathfinder AVHRR Land (PAL) data set, which has been previously described in James and Kalluri (1994) and Agbu (1994) (see References below). This is part of a continuing effort by the GLB group and the GES DAAC to make its data sets easier to use and more accessible to the scientific and educational communities.

PAL NDVI Continental Subset CD Set

The first of these products is a three-CD set containing continental subsets of the PAL, Normalized Difference Vegetation Index (NDVI), 10-day composite data set. This product will be orderable as a CD set or as individual CDs. Data on the CDs have been organized by continent order as follows:

CD 1: North and South America

CD 2: Asia and Australia

CD 3: Africa and Europe

The data on each CD cover the time period from July 13, 1981, through December 31, 1999. The GLB group is continuing processing the PAL data through the year 2000. Data after 1999 will be accessible through the GES DAAC as it becomes available.

Documentation on the CDs is in HTML, making it readable by Web browsers and providing easy navigation of the CDs. PAL NDVI data files on each CD have a corresponding browse file in Graphics Interchange Format (GIF), to enable them to be viewed with a Web browser as shown in the composite image on page 3 (right). This product benefits both the GES DAAC and the user community. It should help the GES DAAC by reducing the offline distribution cost of the PAL NDVI, 10-day composite data. In a very short period of time, CDs have become the most widely used offline computer medium. Their wide use has reduced the cost of production and made them economical for data distribution, even though they have a relatively low storage capacity compared to other mass-storage media, such as 8 mm tape. CD readers are now standard on all computers, making them by far the most accessible mass storage medium. This makes them very convenient to use, and being direct access media, they provide a highly interactive environment for users to work with data.

PAL Daily Tile Data Set

The second product is the PAL Daily Tile Data Set, which was produced from the NOAA-NASA 8-km PAL Daily data. The origins of the PAL Daily Tile Data Set begin with Dr. Chris Duncan at the University of Massachusetts. Chris rearranged the July 13, 1981, through September 14, 1994, PAL 8-km daily data as time series with a convenient final file size in mind. He divided the 5004 x 2168 cell rectangle of the PAL data in the interrupted Goode projection into 40 x 18 "tiles" of 125 x 125 cells each (see page 3, bottom).

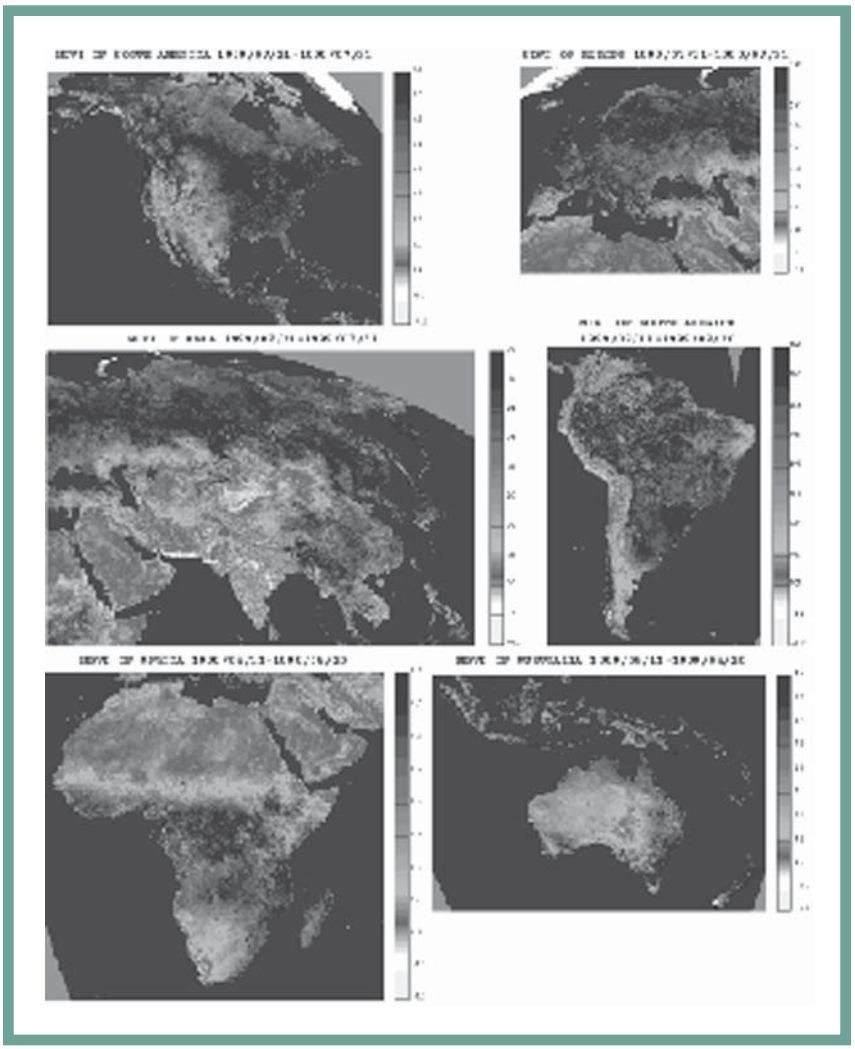
Cell sizes are 8 km, so each tile represents a 1000 x 1000-km region. There are 377 tiles containing at least one land cell. Each tile had twelve time series files, one for each parameter (NDVI, etc.), covering the entire 13-year temporal period of the data.

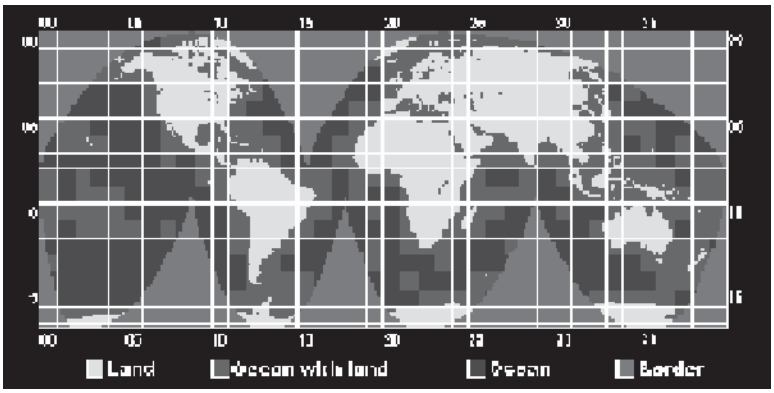
The PAL Daily Data Set has long been inaccessible by most users because of its file configuration. Many of our users were interested in only a few of the key parameters for subglobal regions over a given period of time. The daily data were originally archived in daily global HDF files containing all twelve PAL parameters. One of these files has an uncompressed volume of 228 MB. A user wanting to get just the NDVI data for a specific region, such as Florida, over a 10 year period would have to order and then process 833 GB of data. With the PAL Tile Data Set the volume of data would be 56 MB. Obviously, this is a huge reduction in the volume of data, which makes it practical for many more researchers to use these data.

In 1998 the PAL 10-day composite data were corrected for three errors found in the original PAL 8-km data (Smith et al., 1997) using the methods described in Ye et al. (1995).

- The solar zenith angle (SZA) parameter was calculated incorrectly, and affected channels 1 and 2 reflectances, NDVI, CLAVR flags, and the relative azimuth angles.
- The channel 1 and channel 2 reflectance parameters were not properly normalized for SZA variations.
- An incomplete atmospheric correction was applied to the channel 1 and channel 2 radiances.

Because of the large volume size, these errors were never corrected in the PAL global daily data that Dr. Duncan reconfigured. The PAL Daily Tile Data Set, with its reduced volume, has made it feasible to make these corrections. As part of the implementation of this data set, the PAL daily tile data were corrected for these errors and reconfigured into monthly time series files. This configuration will allow a user to order the data by tile region, parameter, and month. In the future, the PAL daily data from 1995 through the present will be reconfigured into tile, parameter, and monthly time series files and made available.





The PAL NDVI 8-km data are particularly useful for studies of temporal and interannual behavior of surface vegetation and for developing surface background characteristics for use in climate modeling. The PAL 10-day composite data have been the main focus of these types of studies. However, we hope that by correcting the PAL 8-km daily data and making them more usable and accessible, interest in this data set will increase. The data currently covers almost a 20-year period and is the only global daily land data set orderable as a standard product. It will allow users to do diurnal studies and create their own regional temporal composite data using alternative methods to those used in the PAL 10-day composite product. This in turn will open areas of research that were previously inaccessible to most Earth remote sensing scientists.

References

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Smith, P.M., S.N.V. Kalluri, S.D. Prince, and R.S. DeFries, 1997. The NOAA/NASA Pathfinder AVHRR 8-km land data set, *Photogrammetric Engineering and Remote Sensing,* 63:12-31.

Ye, G., M. James, E. Vermote, 1995. Correcting the NOAA/NASA Pathfinder AVHRR Land Data Set for stratospheric aerosols, Geoscience and Remote Sensing Symposium, IGARSS '95. *Quantitative Remote Sensing for Science and Applications, International,* 1:265-276.

Aqua With AIRS Is Coming

by H. Lee Kyle

— with Bruce Vollmer, Michael Theobald, Ed McDonald, Mark Fuerst, & Jianchun Qin —

Aqua (PM–1), the complement satellite to Terra (AM–1), is coming soon, and the GES DAAC is preparing to handle much of its data. The Aqua launch date was recently pushed back from December 21, 2000 to on-or-after May 7, 2001. Its launch will markedly increase the quantity and quality of the products the GES DAAC offers to its customers, more than double the data flow it handles, and increase its science processing responsibilities. Aqua will carry a second MODIS instrument and a suite of new atmospheric sounding instruments (AIRS/AMSU/HSB) that is an improvement over that on the present NOAA operational polar orbiter weather satellites. This article briefly describes the satellite and its mission and then tells how the GES DAAC is preparing for this new responsibility that will double its data flow and data archive.

Aqua

Aqua is one of a series of space based platforms that are central to NASA's Earth Science Enterprise (ESE), a long-term study of the scope, dynamics, and implications of global change. The Aqua program is composed of Aqua and other spacecraft (including Terra and Aura (CHEM)) and a data distribution system (ESDIS and the Mission Operations Center Implementation Team). Multidisciplinary teams of scientists and researchers from North and South America, Asia, Australia, and Europe will put the data to work. The focus for the Aqua project is the multidisciplinary study of Earth's interrelated processes (atmosphere, oceans, and land surface) and their relationship to Earth system changes. The global change research emphasized with the Aqua instrument data sets include atmospheric temperature and humidity profiles; clouds, precipitation, and radiative balance; terrestrial snow and sea ice; sea surface temperature and ocean productivity; soil moisture; and the improvement of numerical weather prediction.

The Aqua satellite will carry six scientific instruments in a circular, 705 km altitude, Sun synchronous, near polar orbit with an ascending node (S to N) 1:30 p.m. local time equator crossing. The satellite period is 98.8 minutes. The instruments are

- Atmospheric Infrared Sounder (AIRS), a scanning spectrometer in the IR (2378 bands, 3.5 to 15.4 microns) plus 4 VIS/NIR channels, 0.4 to 1.0 microns. It is a cross track scanner with a swath of 1,650 km
- Advanced Microwave Sounding Unit (AMSU), 15 channels (50 to 89 GHZ)
- Humidity Sounder for Brazil (HSB), 5 channels (150 to 183 GHZ), from Brazil.

AIRS, AMSU, and HSB combine to measure atmospheric and surface conditions.

- Advanced Microwave Scanning Radiometer-EOS (AMSR-E), 6 channels (6.9 to 89 GHZ). From Japan; its data will be used to provide precipitation rate, water vapor content, and surface moisture content. NSIDC DAAC will handle data.
- Clouds and Earth's Radiant Energy System (CERES). LaRC will handle data.
- Moderate Resolution Imaging Spectroradiometer (MODIS), a multipurpose scanner.

The MODIS and CERES instruments are also on the Terra (AM-1) satellite, which is in a Sun synchronous orbit with a 10:45 a.m. local time equator crossing as it goes north to south. Atmospheric and surface conditions have a strong diurnal cycle, and the combined measurements from the Aqua and Terra satellite give a better measure of this variation. The local observing times of the two satellites (10:45 a.m. and 1:30 p.m. equator crossings) were also selected to minimize local cloud cover and allow a clear view of the surface over much of Earth. The GES DAAC will process the geolocation and conversion to calibrated scientific units for the Aqua MODIS measurements and also archive the output plus the higher level ocean and atmosphere science products as it does for the Terra MODIS (see the *Global Scanner* articles, "Preparations for MODIS," summer 1999 issue , and "The Heart of the DAAC," winter 2000 issue). It will also process and archive the AIRS, AMSU, and HSB measurements.

AIRS, AMSU, and HSB constitute an innovative atmospheric sounding group of visible, infrared, and microwave sensors that should improve the art of measuring atmospheric and surface conditions. The National Weather Service (NWS) has set a target for future measurement requirements for temperature at an accuracy of 1 ℃ in layers 1 km thick and humidity at an accuracy of 20% in layers 2 km thick

in the troposphere (the lower part of the atmosphere). AIRS-AMSU-HSB will meet these requirements, allowing meteorologists to improve and extend their predictions from the current 5-day forecasts to over a week into the future. The standard products will be

ATMOSPHERE
- Atmospheric Temperature Profiles
- Humidity Profile
- Total Precipitable Water
- Fractional Cloud Cover
- Cloud Top Height
- Cloud Top Temperature

SURFACE
- Skin Surface Temperature
- Day/Night Surface Temperature Difference
- Outgoing Day/Night Longwave Surface Flux
- Sea Surface Temperature

There will also be a number of experimental products.

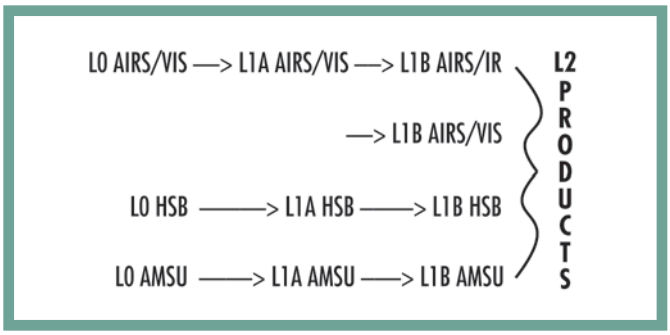
DAAC Preparations

Three GES DAAC groups are particularly involved in the preparations for Aqua data: Systems Execution, Systems Integration, and Customer Support. Mark Fuerst and Ed McDonald of the Systems Execution group say that Aqua will have a separate data and product stream from Terra with its own operations team at the GES DAAC, but it will share computers and other hardware with the GES DAAC V2 operating system that Terra uses. Ten new operators have been brought onboard in preparation for Aqua data processing. A prelaunch version of the Aqua software has been received from ECS, installed, and tested. Upgrades are scheduled in August, September, and October.

The October upgrade will include new hardware to handle the doubled data stream. When in normal operation, Aqua will add 430 gigabytes of MODIS and 79 gigabytes of AIRS-HSB-AMSU per day of data to the flow of data to be archived at the GES DAAC. This will approximately double the data flow into its archive. Only about 1/6th of this is incoming raw level 0 measurements. The GES DAAC produces the geolocated, calibrated radiances plus cloud mask and atmospheric profiles for MODIS. For the AIRS-HSB-AMSU suite it will produce both the geolocated, calibrated measurements and the level 2 science products. The science teams will also send in some higher level products to the archive.

Bruce Vollmer of the Systems Integration group reports that his group is busy bringing in the MODIS and AIRS-HSB-AMSU science production software produced by the science teams. His group integrates the software into the DAAC V2 (ECS) processing system and makes sure that it operates properly. The Aqua MODIS science production software will be very similar to Terra MODIS software, but the AIRS science production software is all new. Mike Theobald is integrating the latter into our V2 system. Moustafa (Mike) Chahine, at the NASA Jet Propulsion Laboratory (JPL) in Pasadena, California, heads the AIRS Science Team that oversees the AIRS experiment and produced the science production software. Evan Manning at JPL advises Mike concerning software details. Mike has installed and tested with simulated data a prelaunch V1.6 version of the AIRS software. A launch capable version V2 will be received and installed in September. A V2.1 launch ready version is expected a couple of months after that.

In the AIRS science processing, packed level 0 data are input to the level 1A algorithms that unpack the data, convert data numbers to engineering units (DN to EU), and attach geolocation information. The level 1A products are collected into granules of data (6 minutes of instrument data). The level 1B algorithms take these granules and produce granules of calibrated L1B products. The level 2 sounding algorithms take the corresponding granules from all three instruments (AIRS, HSB, and AMSU) and produce atmospheric retrieval products.



AIRS Science Processing System Diagram

The science software is divided into product generating executables (PGEs) that perform specific tasks. In the diagram above there are three L1A PGEs, one for each instrument, four L1B PGEs, and one L2 PGE. The AIRS PGEs are activated by the DAAC V2 scheduling program based on the availability of input data and the required computer resources. The L0, L1A, L1B, and L2 products are all archived.

The AIRS Science Team plans to check over the measurements closely before starting full-scale production. This is the first space flight model of the AIRS instrument to be flown, and its many IR lines yield possibilities for numerous innovations. Thus for about the first year the Team Leader Science Computing Facility (TLSCF) at JPL will produce the AIRS products in parallel with the GES DAAC, and the science team will work on improving the preflight version of the sounding algorithms. This will be done in a step-by-step procedure, as follows:

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Aqua With AIRS Is Coming, continued from page 5

- Phase I covers the first 3 months after first light (FL) when instruments start taking data.

  TLSCF:
  —All L0 data to L1A starting with FL
  —All microwave data to L1B at FL+14 days
  —All AIRS data to L1B at FL+45 days.

  GES DAAC:
  —Produce 50% of level 1A products to be checked by AIRS Team.

  The stated goal in this phase is analysis and validation of the L1A products and L1A and L1B quality assurance (QA) products, leading to a delivery to the DAAC of refined L1A software at FL+2–3 months. The processing plans include the use of the daily NOAA radiosonde and ship and buoy data. These together with collocated AIRS radiance measurements will be used in the algorithm improvement studies.
- Phase II, from 3 to 9 months after FL.

  TLSCF:
  —All data to L1B at FL + 4 months
  —L2 sounding products for footprints (golf balls) of radiance data collocated with radiosonde data.

  GES DAAC:
  —Produce 50% of level 1A and 1B products.

  The stated goal here is analysis and validation of the L1A and L1B products and QA data, leading to a delivery to the DAAC of validated L1B software at FL+7–8 months.
- Phase III, 9 to 12 months after FL.

  TLSCF:
  —All data to L2.

  GES DAAC:
  —All data to L2.

  The stated goal here is similar to the other phases, and leads to a delivery of updated L2 software at FL+11 months. About 1 year after launch the GES DAAC will be in full scale AIRS production with tested and approved algorithms.

Because of these phased processing and algorithm improvement steps, AIRS atmospheric soundings are not expected to be available to the general public until close to a year after launch. Reprocessed atmosphere soundings for the first year will be released to the public on a schedule to be announced by the AIRS Science Team.

Customer assistance in ordering, understanding, and using the AIRS measurements and products will be handled by the Atmospheric Dynamics Data Support Team, which is part of the Customer Support group. Software to read the data will be available. Jianchun Qin, the team leader, and Liguang Wu will handle the requests. They will also work with the AIRS Science Team during AIRS phases I, II, and III. Shortly before the launch of Aqua they will put up a Web page linked to their Atmospheric Dynamics home page to inform the public about the progress of the AIRS program. Interested readers should also check the Web pages listed in the following References.

References

Aqua Home Page
http://aqua.gsfc.nasa.gov/

Atmospheric Infrared Sounder (AIRS) Home Page
http://www-airs.jpl.nasa.gov/

Earth Science Mission Profile, gives a path to additional information and to the presently available data
http://eosdatainfo.gsfc.nasa.gov/

MODIS data and information from the GES DAAC (geolocated calibrated radiances plus atmospheric and ocean products)
http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/MODIS/index.html

MODIS Home Page (includes information about the science team and much more)
http://modis.gsfc.nasa.gov/MODIS/

Evolving the NASA ESE Data Center, continued from page 1

Earth science data community including development and deployment of products and data management services for new projects; development of value added products (development of tools that can be reused to do so); new technology development; new project initiatives; and product reuse. For examples see "Partners" in *The Global Scanner, 1:4,* spring 2000. The GES Co-Op's goal is to develop in complete collaboration with individuals being served, keep inventory, and provide data management products and services in response to the changing data management requirements of the Earth science community, and also to develop new applications.

GES DISC's mission is to maximize the investment benefit of NASA's Earth science programs by providing data and services that enable people to fully realize the scientific, educational, and applications potential of global climate data.

Beneficial Outcomes

- The GES DISC will be able to concentrate resources to efficiently address the development and deployment of its products and services to its data management partners.
- The GES DISC will be more responsive to the needs of science research and applications data managers via collaboration to determine the best services to develop for facilitating science.
- The GES DISC will be more in line to further develop new NASA ESE initiatives, such as the Federation and NewDIS, and new and existing information partnerships, such as ESIPs and RESACs, to facilitate the accomplishment of their data management goals.
- The GES DISC will provide an organization for developing, controlling, storing, and distributing inter-

nally and externally developed Earth science data management products and services.

- The GES DISC will be able to share data management expertise and experience with organizations new to data management.

* The GES DISC will be able to create new internal or external independent data management systems to support the Earth science community.

* The Earth science data management community will be able to more clearly understand the GES DISC products and services that can be useful and provided to them.

* The Earth science data management community will be afforded existing and new data management options that will help them focus on their immediate needs.

- The Earth science data management community will be afforded expertise that can assist in clearly defining their data management needs and with whom they can cooperatively specify the capabilities that are needed to best perform their desired data management functions.

GES DAAC News

New Data Products

General News

People in the News

— as reported by George Serafino and the Customer Support Teams —

DATA PRODUCTS AND SERVICES

ATMOSPHERIC CHEMISTRY

Ozone and other trace gas compositions, dynamics, and energy interactions of the upper atmosphere.

New TOMS CD-ROM

A new TOMS CD-ROM for the EP TOMS instrument covering years 1996 through 1999 is now available from the GES DAAC. It was produced by the Atmospheric Chemistry and Dynamics Group (NASA GSFC Code 916). Its initial distribution was at the 2000 Quadrennial Ozone Symposium, which was held in Sapporo, Japan, July 3-8. It contains

- Daily and monthly total ozone and an aerosol index on a global grid
- Daily and monthly averaged GIF images of aerosol and ozone
- Overpass total ozone data for 457 distinct locations on Earth
- Information on trends, ozone hole monitoring, and calibration, and an EP TOMS User Guide.

HYDROLOGY

Global precipitation, its variability, and associated latent heating, important for studying the global hydrological cycle, climate modeling, and applications.

Some Old News

As you all know, the TSDIS Version 5 reprocessing of TRMM data, begun November 23, 1999, was completed April 30, 2000. Data files generated with the new science algorithms are identified by file names that end in ".5.HDF" where 5 is the product version number. No definite start date has been set yet for the Version 6 reprocessing, but it probably will be some time in 2001.

TRMM Data Products

Three products are now accessible from the TRMM Web interface

http://lake.nascom.nasa.gov/data/dataset/TRMM/index.html

They include

TRMM Gridded Orbital Subsets—originally released in January 1999 and available since then from the TRMM anonymous ftp site. These are derived from the TRMM standard products VIRS Radiance, 1B01; TMI Rain Profile, 2A12; and TRMM Combined Instrument Rainfall, 2B31. They can be accessed from

http://lake.nascom.nasa.gov/data/dataset/TRMM/01_Data_Products/04_Subset/02_Gridded_Orbital/index.html

Statistics of the TRMM anonymous ftp site have indicated these gridded orbital products to be, consistently and by far, the most popular data downloaded. Please note that, even though these gridded data are now accessible from the TRMM Web interface, the most recent few monts of data can still be downloaded from

ftp://lake.nascom.nasa.gov/data/TRMM/Gridded/

Satellite CSI (Coincident Subsetted Intermediate) Subsets—These are collections of instrument scan data when the TRMM statellite passes

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over a ground validation or experiment site. Currently, data for 11 sites are accessible from

http://lake.nascom.nasa.gov/data/dataset/TRMM/01_Data_Products/04_Subset/03_Satellite_CSI/index.html

Merged-IR GOES Precipitation Index (GPI) Precipitation Estimates—Available for downloading either directly from

ftp://lake.nascom.nasa.gov/data/TRMM/Ancillary/3A44/

or via the TRMM Web interface,

http://lake.nascom.nasa.gov/data/dataset/TRMM/01_Data_Products/06_Ancillary/index.html

Keyword Search

Now available from within the TRMM Web interface (see "TRMM Data Products" for path). Click on the "Keyword Search" button along the top of any of the pages.

A Reminder

TRMM Level 1 data (1B01, 1B11, 1B21, 1C21, 1A01, and 1A11) are also accessible via the Earth Observing System (EOS) Data Gateway,

http://redhook.gsfc.nasa.gov/~imswww/pub/imswelcome/

(a new URL), from which one can access data not only from the Goddard DAAC, but also from all the other DAACs.

TRMM Web Page Updates

Goddard DAAC's TRMM Global Validation site,

http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/TRMM_FE/trmm_fe.html

and TRMM Field Experiiment Ancillary Data Sets site,

http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/TRMM_FE/trmm_anc.html

have had many new data sets added since the sites' original release in the spring of 1999, notably data from the Kwajalein Experiment (KWAJEX), which took place between July and September 1999.

A New Look

Some of you may have noticed that our recent responses to your eMail queries have taken on a somewhat more formal look (complete with tracking numbers). This is because we are now using a new user assistance system to help us better track the numerous eMail messages from our users.

Goddard DAAC Web Geographical Information System (GIS) Prototype

The Web GIS prototype has been released at

http://daac.gsfc.nasa.gov/WEBGIS/

where, for certain geographical regions, users can search for and display various data, with or without certain ancillary overlays. The Gridded 2B31 product, subset into geographical regions and converted into a GIS compatible format, is currently available. Other data products will be added in the future.

LAND BIOSPHERE

Long time-series vegetation and thermal infrared brightness temperature data sets for global change research.

Normalized Difference Vegetation Index (NDVI) CDs

A set of three CDs present 10-day composite data for the period July 13, 1981, through December 31, 1999. CD1 covers North and South America, CD2 covers Asia and Australia, and CD3 covers Africa and Europe. The CDs may be ordered individually or as a set. See the article by James McManus in this newsletter.

Reformatted Pathfinder AVHRR Land (PAL) Data

Check out the reformatted PAL Daily Ttile Data Set for the period July 13, 1981, through September 14, 1994. The tiles are 1000 x 1000 km regions covering the global land areas. Separate tile data sets for each of the 12 PAL parameters, including the popular NDVI, can now be ordered. See the article by James McManus in this newsletter.

MODIS DATA SUPPORT

Radiance data and auxiliary information such as geolocation and cloud mask, atmospheric profiles, and higher level ocean color data.

Coming Soon

Release to the public of MODIS atmospheric and ocean science products, Level 2 (as observed) and Level 3 (on a world grid). The atmospheric products include cloud information, aerosol optical thickness over land and oceans, and other information. Ocean color and sea surface temperature information is included in the ocean products. The products will be released as the data and the public site are made ready. Some Level 2 atmospheric products may be available in September with other Levels 2 and 3 products to follow. The Level 2 ocean products will be available in October, to be soon followed by 70 Level 3 products. Keep an eye on the MODIS Data Support Web page for the current status and access to the data as the products are released.

http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/MODIS/index.html

Do It Yourself

For those interested and able to receive Direct Broadcast data from the MODIS instrument on the Terra satellite, software is now available. This software allows the user to quickly turn locally received MODIS measurements into calibrated radiances. For more information and details of how to obtain the software, see

http://daac.gsfc.nasa.gov/DAAC_DOCS/direct_broadcast/db.html

OCEAN COLOR

Remote sensing ocean color data used to investigate ocean productivity, marine optical properties, and the interaction of winds and currents with ocean biology.

SeaWiFS Reprocessing

Reprocessing #3 was completed in the spring, all the data have now been transferred to the GES DAAC and are presently available for order. Read the description of Reprocessing #3 on the SeaWiFS Project Web page at

http://seawifs.gsfc.nasa.gov/SEAWIFS/RECAL/Repro3/

The new files are called "Version 3," corresponding to Reprocessing #3. Though the data are being received in approximate chronological order, they are not in exact chronological order, and we're also receiving new, original data at the same time. Note that HRPT station data were not reprocessed this time, so most of the HRPT station data files will be "Version 2." There isn't a significant difference in the L1A HRPT station data between Versions 2 and 3. It just means that all of the data processed after June 2, 2000, is called "Version 3."

Also be sure to check out our other important data products in the areas of

ATMOSPHERIC DYNAMICS

3-D dynamic and thermodynamic state of the Earth-atmosphere system, from satellite measurements and assimilation systems,

FIELD EXPERIMENTS

Aircraft and ground based measurements of meteorological variables designed to improve science algorithms and validate satellite-derived data products,

INTERDISCIPLINARY

Global land, ocean, and atmospheric parameters mapped to uniform spatial and temporal scales for basic research and applications studies.

For more details about the GES DAAC data holdings and to order data see our Home Page or contact us by eMail, phone, or fax.

http://daac.gsfc.nasa.gov/

eMail: daacuso@daac.gsfc.nasa.gov
voice: 301-614-5224
fax: 301-614-5268

GENERAL NEWS

Personnel Changes

User Services personnel changes were announced by Steve Kempler on July 6. Effective immediately, User Services activities will be handled in the following manner, consistent with GES DAAC User Services arrangements that have been in place over the last few years.

Frances Bergmann will remain as the User Services Lead for V0-V1 data products and services (TRMM and data sets starting before 1999). Ms. Bergmann will also be the GES DAAC point of contact for external User Services related activities, such as the DAAC User Services Working Group, DAAC Outreach, and conference coordination. She will be supported by Darnell Tab and Jenn Mahoney. Contact: Phone, 301-614-5224 or 1-877-794-3147; eMail,

daacuso@daac.gsfc.nasa.gov

Peggy Eaton, supported by Leena Snoddy and Cathy Hughes, will coordinate the User Services for V2 (ECS) MODIS and other data products and services. Contact: Phone, 301-604-5473; Fax, 301-614-5304; eMail,

daac_usg@gsfcsrvr4.gsfcmo.ecs.nasa.gov

Ms. Eaton and Ms. Bergmann will work closely to ensure that User Services for all DAAC systems are properly covered and considered in regard to telephone coverage, eMail coverage, outreach, USWG, etc. The V2 (ECS) system handles MODIS data and will handle AIRS data after the successful launch of the Aqua satellite. The V0 and V1 systems handle all previous data sets, such as TRMM, SeaWiFS, Atmospheric Chemistry, Land Biosphere, etc.

Within the next 6 months it is planned to colocate all User Services personnel into the same area.

The V0-V1 User Services relationship with the supporting DSTs will remain the same. The V2 User Services-DSTs relationship will be consistent with their V0 and V1 counterparts.

George Serafino, as Data Support Team Manager, will have overall authority for all User Services.

The GES DISC—A New Name for Increased Responsibilities

The Goddard Earth Sciences (GES) Data and Information Services Center (DISC) is the new organization, which includes the GES Distributed Active Archive Center (DAAC) and the Products and Services Cooperative (PSC or "the Co-Op"). The new name reflects the added responsibilities and methods that our group is taking on and developing. See the accompanying article by Steve Kempler, "Evolving the NASA Earth Sciences Enterprise (ESE) Data Center," the first article in this newsletter.

Meetings & Presentations

Chris Lynnes presented a paper at the Fourth International Conference on Direct Broadcasting of Earth Observation Data in Dundee, Scotland. The paper, "Level 1 processing of direct broadcast data," was coauthored by Peter Smith and Larry Shotland of the DAAC and Tarek El-Ghazawi and Ming Zhu of George Mason University.

TRMM Statistics

As of the end of May 2000, the total volume of TRMM data archived at the Goddard DAAC is ~11.4 TB, and the total volume shipped to users is ~40.7 TB. These data include the standard TRMM HDF products from TSDIS as well as the derived data produced by the Goddard DAAC. The volumes are compressed, with an overall compression ratio of about 10:3.

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PEOPLE IN THE NEWS

Welcome to **Denis Nadeau** who joined Jim Acker's Ocean Color Data Support Team at the end of June. Denis has been working on a Ph.D. at the University of South Florida (USF) with Frank Muller-Karger, and has also ably assisted USF's ocean color data management activities. USF is sad to see him go, but their loss is our gain. Jim has several challenging projects ready for Denis to tackle.

Catherine Harnden has stepped down as head of DAAC Operations, but remains in the Global Change Data Center (Code 902).

Steve Berrick, of the Science Software Integration and Test (SSI&T) group, is the DISC Personality Sketch this issue. He writes

"I was born and raised in New Mexico, the "Land Of Enchantment," land of high desert, clear skies, and the green chile. — That was a boldfaced lie. I was actually born in Pittsburgh, but I have since decided to change my place of birth to New Mexico, which sounds so much more exotic, and I had lived there for many years (more on that later). In truth, Pittsburgh wasn't so bad, when you're young and stupid and don't know any better, that is.

"Not long after I was born, my parents started moving my sister and me around the country a lot. We lived in exciting places like Cleveland, Denver, and Venice (California that is, not Italy). All this before the age of five. I grew up thinking that moving was something everyone did every few years. I was mortified when my folks finally bought a house and settled down. I had been addicted to the hustle and bustle of moving, the smell of cardboard boxes everywhere, and waking up somewhere that I didn't immediately recognize. Oh, well.

"When I was still a kid, my passion was to be an architect. I used to love building things, especially with Leggos. But then a family member told me that my love of Leggos meant that my real yearning was to be a bricklayer. That didn't sound so good. So I became interested in science instead. Actually, I had always been interested in science, something my father used to encourage in both me and my sister. My father was very well read, a self-taught electrical engineer, and there were always tons of books around the house.

"Well-armed with my love of books, I began my first year of high school by cutting classes, 90 days my freshman year, mostly spent at Sears which was located conveniently across the street. Naturally, I got caught a lot and I was in the vice-principal's office so much, he asked me to call him by his first name.

"Fortunately, before my sophomore year, my parents moved and I attended another high school. I'm proud to say that I only missed one day illegally after that. After graduating high school way back in 1977 (yes, life really was just like "That 70's Show"), I enrolled at Duquesne University with a major in physics and a minor in math. By the end of my first semester, I was on academic probation. Hey, I was in college for the first time. I managed to improve after that and graduated with a GPA of 3.25 (not sure exactly, but it was respectable).

"During these years, I had become interested in astronomy. I guess it was always seeing Carl Sagan on TV or going to the Pittsburgh Planetarium, or something I read. I'm not sure how or when, but I knew that I wanted to continue my education in astronomy. After Duquesne, I applied to several universities, and promptly got turned down by all. After scraping up my last shreds of dignity, I decided to apply again. But first I would insure my acceptance by first volunteering at the Allegheny Observatory in Pittsburgh. Yes, I was surprised too that there was an observatory in Pittsburgh, the city where if the Sun pops out of the clouds for a minute, the weatherman later that day would call it "partly sunny." But there it was, and I worked there for several months during the summer, meeting the astronomers, hanging out with them. It was schmoozing before I had even heard the word (was it even invented then?). It was really pretty boring stuff, cataloging old photographic plates in some proto-computer, but the activities there did keep my interest. I didn't appreciate it then, but the "big" project that they were working on involved detecting extrasolar planets via the minuscule wobbles of parent stars. It would later bear fruit, but long after I had left.

"Through contacts at the observatory, I learned about the astronomy department at New Mexico State University. The description of the department and its environs got me really excited. So, I applied, and this time I had the Director of the Observatory write a recommendation and even contact the department head personally. I wasn't taking any chances.

Could it be that the universe is using subliminal gastronomic enticements to recruit new astronomers?

(Nebula feature clipped from the HUBBLESITE Showcase page at http://hubble.stsci.edu)

"In the late summer of 1983, my family hopped into the family car and drove the approximately 2000 miles to New Mexico. We were making a vacation out of getting me set up there, there being Las Cruces. Las Cruces was a town whose name I couldn't even correctly pronounce when I first talked to the head of the astronomy department after I had been accepted into the doctorate program. After traveling through no-name places like Nashville and visiting no-interest places like Opry Land and Twitty City (near the future Dollywood), we arrived in Las Cruces, New Mexico.

"In late July, the temperatures were over 100 degrees and I was completely enamoured by the place. My heart skipped a beat when I saw my first tumbleweed roll across the road. Other firsts would follow after I got settled that fall: my first encounter with a roadrunner (the state bird), the first sights of houses using colored rocks and stones and cactus in place of a green lawn and hedges, my first taste of green chile (something worth dying for), and of course, my first tequila in Juarez, Mexico (and my second, third, fourth, etc.). Astronomy was exciting and fun back then and being wretchedly poor living off of a teaching assistant stipend was kind of fun too. The industry (what pompous professors called the field of astronomy) was changing then from the use of photographic plates and photomultipliers to charged-couple devices (or CCDs). Not soon enough though. I still had a class where we were taught the fine art of cutting photographic plates in complete darkness (red lights were for wusses). And even though the Internet and C programming language were beginning to spread back then, the programming language *de rigueur* was sterile FORTRAN 77 (you had to use uppercase back then) and the method for programming was largely punch cards or, if you were lucky, dumb terminals. JCL, anyone?

"After two years, I began working part-time at a local US Army contractor, Science and Technology Corp. (STC). There I began putting my FORTRAN knowledge to work on an obsolete computer (Prime) using an antiquated operating system (PrimeOS, with no resemblance to any other known OS) and working with an ancient data base called RIM (it was written in FORTRAN for goodness sakes!). And I began earning money. Which enabled me to buy things besides Ramen noodles and peanut butter. I liked this too. Before I knew it, I realized that I had become seduced by the dark side. Midway into my PhD thesis work, which by then was admittedly languishing, I decided to bow out gracefully and accept the Master's. I officially graduated in 1992 with a Master's, although it was in 1987 that I had actually completed it. I went full time at STC.

"My work at STC was largely in modeling thermal imagers and doing radiative transfer through smokes and obscurants (Army battlefield jargon) using Monte Carlo techniques. I became involved in modifying and augmenting a library of battlefield atmospherics simulation code with the unwieldy name Electro-Optical Systems Atmospherics Effects Library or EOSAEL.

"By about 1993, the contract situation at my company was less than ideal. There seemed to be the danger of

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hard times ahead. So, I began looking around on the Net to see what jobs were out there (we're talking pre-Web). I used to peruse the newsgroups for jobs in the area. I wasn't terribly serious about it though. On a whim, I submitted my resume to some place in the Washington, DC, area and promptly forgot about it.

"In January 1994, someone from Research Data Systems Corporation (RDC) called me up. He said why he was calling and I said 'Huh?' Several weeks later, I threw my two cats into the back of my car and drove 2000 miles to Washington, DC, the city that I thought you'd have to be brain dead to live in.

"At RDC, I worked on the Science Data Support Team for MODIS. It was still 1994 and ECS (Earth Observing System Data and Information System (EOSDIS) Core System) was far off in the fanciful future. So, times were pretty good. I worked on trying to understand this ECS thing we kept hearing about and trying to morph science code into what we thought it had to be for working within the ECS.

"A year later, I decided to join ECS and learn from the inside. I was working at Hughes, which became Raytheon, several times. There, I worked in the ECS Science Office and was the science liaison for MODIS. This involved a lot of information gathering, again trying to get MODIS algorithms aligned to ECS and also providing design requirements from MODIS back to ECS development. We were also preparing for the first ECS prototype called IR1 (Interim Release 1, lovely name, isn't it?). Getting the MODIS science algorithms to working within the prototype ECS would be the job of the Goddard DAAC Science Software Integration and Test (SSI&T) group. The work was fun and exciting and ever challenging. I also began to really enjoy working at the DAAC. Before I knew it, I had become assimilated.

"The next move was inevitable. In 1998, I joined the Goddard DAAC. My work at the DAAC has largely been SSI&T of the MODIS science algorithms with the ECS. Today, I'm the SSI&T lead for the Goddard DAAC. That role has expanded to supporting the AIRS instrument and another MODIS instrument on the Aqua spacecraft as well as work in other areas of data production. And other work will follow. These later years have been exciting and challenging and a pleasure to work with everyone at the DAAC. My experiences are best typified by this MODIS and ECS analogy.

"MODIS is a gigantic spacecraft, heading at warp speed for a docking with a mastodonic space station, namely ECS. And all the while both are being designed, built, torn down, redesigned, and rebuilt over and over again with only one thing certain—they will meet at launch date.

"It doesn't get any better than this.

The Global Scanner is a publication of NASA's Goddard Space Flight Center Earth Sciences (GES) Data & Information Services Center (DISC).
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